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SANGAR, DAVID V.
LEMON, STANLEY M.
RIJNBRAND, RENE

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<150> PCT/US2003/021002

<151> 2003-07-02

<150> 10/189,359

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Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro Arg Arg Ser Arg	
105 110 115	
aat ttg ggt aag gtc atc gat acc ctt acg tgc ggc ttc gcc gac ctc	740
Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys Gly Phe Ala Asp Leu	
120 125 130	
atg ggg tac ata ccg ctc gtc ggc gcc cct ctt gga ggc gct gcc agg	788
Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu Gly Gly Ala Ala Arg	
135 140 145	
gcc ctg gcg cat ggc gtc cgg gtt ctg gaa gac ggc gtg aac tat gca	836
Ala Leu Ala His Gly Val Arg Val Leu Glu Asp Gly Val Asn Tyr Ala	
150 155 160 165	
aca ggg aac ctt cct ggt tgc tct ttc tct atc ttc ctt ctg gcc ctg	884
Thr Gly Asn Leu Pro Gly Cys Ser Phe Ser Ile Phe Leu Leu Ala Leu	
170 175 180	
ctc tct tgc ctg act gtg ccc gct tca gcc tac caa gtg cgc aat tcc	932
Leu Ser Cys Leu Thr Val Pro Ala Ser Ala Tyr Gln Val Arg Asn Ser	
185 190 195	
tcg ggg ctt tac cat gtc acc aat gat tgc cct aac tcg agt att gtg	980
Ser Gly Leu Tyr His Val Thr Asn Asp Cys Pro Asn Ser Ser Ile Val	
200 205 210	
tac gag gcg gcc gat gcc atc ctg cac act ccg ggg tgt gtc cct tgc	1028
Tyr Glu Ala Ala Asp Ala Ile Leu His Thr Pro Gly Cys Val Pro Cys	
215 220 225	
gtt cgc gag ggt aac gcc tcg agg tgt tgg gtg gcg gtg acc ccc acg	1076
Val Arg Glu Gly Asn Ala Ser Arg Cys Trp Val Ala Val Thr Pro Thr	
230 235 240 245	
gtg gcc acc agg gac ggc aaa ctc ccc aca acg cag ctt cga cgt cat	1124
Val Ala Thr Arg Asp Gly Lys Leu Pro Thr Thr Gln Leu Arg Arg His	
250 255 260	
atc gat ctg ctt gtc ggg agc gcc acc ctc tgc tcg gcc ctc tac gtg	1172
Ile Asp Leu Leu Val Gly Ser Ala Thr Leu Cys Ser Ala Leu Tyr Val	
265 270 275	
ggg gac ctg tgc ggg tct gtc ttt ctt gtt ggt caa ctg ttt acc ttc	1220
Gly Asp Leu Cys Gly Ser Val Phe Leu Val Gly Gln Leu Phe Thr Phe	
280 285 290	
tct ccc agg cgc cac tgg acg acg caa gac tgc aat tgt tct atc tat	1268
Ser Pro Arg Arg His Trp Thr Thr Gln Asp Cys Asn Cys Ser Ile Tyr	
295 300 305	
ccc ggc cat ata acg ggt cat cgc atg gca tgg gat atg atg atg aac	1316

Pro	Gly	His	Ile	Thr	Gly	His	Arg	Met	Ala	Trp	Asp	Met	Met	Met	Asn	
310					315					320					325	
tgg	tcc	cct	acg	gca	gcg	ttg	gtg	gta	gct	cag	ctg	ctc	cgg	atc	cca	1364
Trp	Ser	Pro	Thr	Ala	Ala	Leu	Val	Val	Ala	Gln	Leu	Leu	Arg	Ile	Pro	
				330					335					340		
caa	gcc	atc	atg	gac	atg	atc	gct	ggg	gct	cac	tgg	gga	gtc	ctg	gcg	1412
Gln	Ala	Ile	Met	Asp	Met	Ile	Ala	Gly	Ala	His	Trp	Gly	Val	Leu	Ala	
			345					350					355			
ggc	ata	gcg	tat	ttc	tcc	atg	gtg	ggg	aac	tgg	gcg	aag	gtc	ctg	gta	1460
Gly	Ile	Ala	Tyr	Phe	Ser	Met	Val	Gly	Asn	Trp	Ala	Lys	Val	Leu	Val	
		360					365					370				
gtg	ctg	ctg	cta	ttt	gcc	ggc	gtc	gac	gcg	gaa	acc	cac	gtc	acc	ggg	1508
Val	Leu	Leu	Leu	Phe	Ala	Gly	Val	Asp	Ala	Glu	Thr	His	Val	Thr	Gly	
		375				380					385					
gga	aat	gcc	ggc	cgc	acc	acg	gct	ggg	ctt	gtt	ggg	ctc	ctt	aca	cca	1556
Gly	Asn	Ala	Gly	Arg	Thr	Thr	Ala	Gly	Leu	Val	Gly	Leu	Leu	Thr	Pro	
390					395					400					405	
ggc	gcc	aag	cag	aac	atc	caa	ctg	atc	aac	acc	aac	ggc	agt	tgg	cac	1604
Gly	Ala	Lys	Gln	Asn	Ile	Gln	Leu	Ile	Asn	Thr	Asn	Gly	Ser	Trp	His	
			410						415					420		
atc	aat	agc	acg	gcc	ttg	aat	tgc	aat	gaa	agc	ctt	aac	acc	ggc	tgg	1652
Ile	Asn	Ser	Thr	Ala	Leu	Asn	Cys	Asn	Glu	Ser	Leu	Asn	Thr	Gly	Trp	
			425					430					435			
tta	gca	ggg	ctc	ttc	tat	caa	cac	aaa	ttc	aac	tct	tca	ggc	tgt	cct	1700
Leu	Ala	Gly	Leu	Phe	Tyr	Gln	His	Lys	Phe	Asn	Ser	Ser	Gly	Cys	Pro	
		440					445					450				
gag	agg	ttg	gcc	agc	tgc	cga	cgc	ctt	acc	gat	ttt	gcc	cag	ggc	tgg	1748
Glu	Arg	Leu	Ala	Ser	Cys	Arg	Arg	Leu	Thr	Asp	Phe	Ala	Gln	Gly	Trp	
	455					460					465					
ggg	cct	atc	agt	tat	gcc	aac	gga	agc	ggc	ctc	gac	gaa	cgc	ccc	tac	1796
Gly	Pro	Ile	Ser	Tyr	Ala	Asn	Gly	Ser	Gly	Leu	Asp	Glu	Arg	Pro	Tyr	
470					475					480					485	
tgc	tgg	cac	tac	cct	cca	aga	cct	tgt	ggc	att	gtg	ccc	gca	aag	agc	1844
Cys	Trp	His	Tyr	Pro	Pro	Arg	Pro	Cys	Gly	Ile	Val	Pro	Ala	Lys	Ser	
				490					495					500		
gtg	tgt	ggc	ccg	gta	tat	tgc	ttc	act	ccc	agc	ccc	gtg	gtg	gtg	gga	1892
Val	Cys	Gly	Pro	Val	Tyr	Cys	Phe	Thr	Pro	Ser	Pro	Val	Val	Val	Gly	
			505					510				515				
acg	acc	gac	agg	tcg	ggc	gcg	cct	acc	tac	agc	tgg	ggg	gca	aat	gat	1940
Thr	Thr	Asp	Arg	Ser	Gly	Ala	Pro	Thr	Tyr	Ser	Trp	Gly	Ala	Asn	Asp	
		520					525					530				
acg	gat	gtc	ttc	gtc	ctt	aac	aac	acc	agg	cca	ccg	ctg	ggc	aat	tgg	1988
Thr	Asp	Val	Phe	Val	Leu	Asn	Asn	Thr	Arg	Pro	Pro	Leu	Gly	Asn	Trp	
	535					540					545					
ttc	ggg	tgt	acc	tgg	atg	aac	tca	act	gga	ttc	acc	aaa	gtg	tgc	gga	2036
Phe	Gly	Cys	Thr	Trp	Met	Asn	Ser	Thr	Gly	Phe	Thr	Lys	Val	Cys	Gly	

550				555				560				565				
gcg Ala	ccc Pro	cct Pro	tgt Cys	gtc Val 570	atc Ile	gga Gly	ggg Gly	gtg Val	ggc Gly 575	aac Asn	aac Asn	acc Thr	ttg Leu	ctc Leu 580	tgc Cys	2084
ccc Pro	act Thr	gat Asp	tgc Cys 585	ttc Phe	cgc Arg	aaa Lys	cat His	ccg Pro 590	gaa Glu	gcc Ala	aca Thr	tac Tyr	tct Ser 595	cgg Arg	tgc Cys	2132
ggc Gly	tcc Ser	ggg Gly 600	ccc Pro	tgg Trp	att Ile	aca Thr	ccc Pro 605	agg Arg	tgc Cys	atg Met	gtc Val	gac Asp 610	tac Tyr	ccg Pro	tat Tyr	2180
agg Arg	ctt Leu 615	tgg Trp	cac His	tat Tyr	cct Pro	tgt Cys 620	acc Thr	atc Ile	aat Asn	tac Tyr 625	acc Thr	ata Ile	ttc Phe	aaa Lys	gtc Val	2228
agg Arg 630	atg Met	tac Tyr	gtg Val	gga Gly 635	ggg Gly	gtc Val	gag Glu	cac His	agg Arg	ctg Leu 640	gaa Glu	gcg Ala	gcc Ala	tgc Cys	aac Asn 645	2276
tgg Trp	acg Thr	cgg Arg	ggc Gly	gaa Glu 650	cgc Arg	tgt Cys	gat Asp	ctg Leu	gaa Glu 655	gac Asp	agg Arg	gac Asp	agg Arg	tcc Ser 660	gag Glu	2324
ctc Leu	agc Ser	ccg Pro	ttg Leu 665	ctg Leu	ctg Leu	tcc Ser	acc Thr	aca Thr 670	cag Gln	tgg Trp	cag Gln	gtc Val	ctt Leu 675	ccg Pro	tgt Cys	2372
tct Ser	ttc Phe	acg Thr 680	acc Thr	ctg Leu	cca Pro	gcc Ala	ttg Leu 685	tcc Ser	acc Thr	ggc Gly	ctc Leu	atc Ile 690	cac His	ctc Leu	cac His	2420
cag Gln	aac Asn 695	att Ile	gtg Val	gac Asp	gtg Val	cag Gln 700	tac Tyr	ttg Leu	tac Tyr	ggg Gly 705	gta Val	ggg Gly	tca Ser	agc Ser	atc Ile	2468
gcg Ala 710	tcc Ser	tgg Trp	gcc Ala	att Ile 715	aag Lys	tgg Trp	gag Glu	tac Tyr	gtc Val 720	gtt Val	ctc Leu	ctg Leu	ttc Phe	ctt Leu	ctg Leu 725	2516
ctt Leu	gca Ala	gac Asp	gcg Ala	cgc Arg 730	gtc Val	tgc Cys	tcc Ser	tgc Cys	ttg Leu 735	tgg Trp	atg Met	atg Met	tta Leu	ctc Leu 740	ata Ile	2564
tcc Ser	caa Gln	gcg Ala	gag Glu 745	gcg Ala	gct Ala	ttg Leu	gag Glu	aac Asn 750	ctc Leu	gta Val	ata Ile	ctc Leu	aat Asn 755	gca Ala	gca Ala	2612
tcc Ser	ctg Leu	gcc Ala 760	ggg Gly	acg Thr	cac His	ggg Gly 765	ctt Leu	gtg Val	tcc Ser	ttc Phe	ctc Leu	gtg Val 770	ttc Phe	ttc Phe	tgc Cys	2660
ttt Phe	gcg Ala 775	tgg Trp	tat Tyr	ctg Leu	aag Lys	ggg Gly 780	agg Arg	tgg Trp	gtg Val	ccc Pro	gga Gly 785	gcg Ala	gtc Val	tac Tyr	gcc Ala	2708
ctc Leu 790	tac Tyr	ggg Gly	atg Met	tgg Trp	cct Pro 795	ctc Leu	ctc Leu	ctg Leu	ctc Leu	ctg Leu 800	ctg Leu	gcg Ala	ttg Leu	cct Pro	cag Gln 805	2756

cgg gca tac gca ctg gac acg gag gtg gcc gcg tcg tgt ggc ggc gtt	2804
Arg Ala Tyr Ala Leu Asp Thr Glu Val Ala Ala Ser Cys Gly Gly Val	
810 815 820	
gtt ctt gtc ggg tta atg gcg ctg act ctg tcg cca tat tac aag cgc	2852
Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser Pro Tyr Tyr Lys Arg	
825 830 835	
tat atc agc tgg tgc atg tgg tgg ctt cag tat ttt ctg acc aga gta	2900
Tyr Ile Ser Trp Cys Met Trp Trp Leu Gln Tyr Phe Leu Thr Arg Val	
840 845 850	
gaa gcg caa ctg cac gtg tgg gtt ccc ccc ctc aac gtc cgg ggg ggg	2948
Glu Ala Gln Leu His Val Trp Val Pro Pro Leu Asn Val Arg Gly Gly	
855 860 865	
cgc gat gcc gtc atc tta ctc atg tgt gta gta cac ccg acc ctg gta	2996
Arg Asp Ala Val Ile Leu Leu Met Cys Val Val His Pro Thr Leu Val	
870 875 880 885	
ttt gac atc acc aaa cta ctc ctg gcc atc ttc gga ccc ctt tgg att	3044
Phe Asp Ile Thr Lys Leu Leu Leu Ala Ile Phe Gly Pro Leu Trp Ile	
890 895 900	
ctt caa gcc agt ttg ctt aaa gtc ccc tac ttc gtg cgc gtt caa ggc	3092
Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe Val Arg Val Gln Gly	
905 910 915	
ctt ctc cgg atc tgc gcg cta gcg cgg aag ata gcc gga ggt cat tac	3140
Leu Leu Arg Ile Cys Ala Leu Ala Arg Lys Ile Ala Gly Gly His Tyr	
920 925 930	
gtg caa atg gcc atc atc aag tta ggg gcg ctt act ggc acc tat gtg	3188
Val Gln Met Ala Ile Ile Lys Leu Gly Ala Leu Thr Gly Thr Tyr Val	
935 940 945	
tat aac cat ctc acc cct ctt cga gac tgg gcg cac aac ggc ctg cga	3236
Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala His Asn Gly Leu Arg	
950 955 960 965	
gat ctg gcc gtg gct gtg gaa cca gtc gtc ttc tcc cga atg gag acc	3284
Asp Leu Ala Val Ala Val Glu Pro Val Val Phe Ser Arg Met Glu Thr	
970 975 980	
aag ctc atc acg tgg ggg gca gat acc gcc gcg tgc ggt gac atc atc	3332
Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala Cys Gly Asp Ile Ile	
985 990 995	
aac ggc ttg ccc gtc tct gcc cgt agg ggc cag gag ata ctg ctt ggg	3380
Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Gln Glu Ile Leu Leu Gly	
1000 1005 1010	
cca gcc gac gga atg gtc tcc aag ggg tgg agg ttg ctg gcg ccc atc	3428
Pro Ala Asp Gly Met Val Ser Lys Gly Trp Arg Leu Leu Ala Pro Ile	
1015 1020 1025	
acg gcg tac gcc cag cag acg aga ggc ctc cta ggg tgt ata atc acc	3476
Thr Ala Tyr Ala Gln Gln Thr Arg Gly Leu Leu Gly Cys Ile Ile Thr	
1030 1035 1040 1045	

agc ctg act ggc cgg gac aaa aac caa gtg gag ggt gag gtc cag atc	3524
Ser Leu Thr Gly Arg Asp Lys Asn Gln Val Glu Gly Glu Val Gln Ile	
1050 1055 1060	
gtg tca act gct acc caa acc ttc ctg gca acg tgc atc aat ggg gta	3572
Val Ser Thr Ala Thr Gln Thr Phe Leu Ala Thr Cys Ile Asn Gly Val	
1065 1070 1075	
tgc tgg act gtc tac cac ggg gcc gga acg agg acc atc gca tca ccc	3620
Cys Trp Thr Val Tyr His Gly Ala Gly Thr Arg Thr Ile Ala Ser Pro	
1080 1085 1090	
aag ggt cct gtc atc cag atg tat acc aat gtg gac caa gac ctt gtg	3668
Lys Gly Pro Val Ile Gln Met Tyr Thr Asn Val Asp Gln Asp Leu Val	
1095 1100 1105	
ggc tgg ccc gct cct caa ggt tcc cgc tca ttg aca ccc tgt acc tgc	3716
Gly Trp Pro Ala Pro Gln Gly Ser Arg Ser Leu Thr Pro Cys Thr Cys	
1110 1115 1120 1125	
ggc tcc tcg gac ctt tac ctg gtc acg agg cac gcc gat gtc att ccc	3764
Gly Ser Ser Asp Leu Tyr Leu Val Thr Arg His Ala Asp Val Ile Pro	
1130 1135 1140	
gtg cgc cgg cga ggt gat agc agg ggt agc ctg ctt tcg ccc cgg ccc	3812
Val Arg Arg Arg Gly Asp Ser Arg Gly Ser Leu Leu Ser Pro Arg Pro	
1145 1150 1155	
att tcc tac ttg aaa ggc tcc tcg ggg ggt ccg ctg ttg tgc ccc gcg	3860
Ile Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu Leu Cys Pro Ala	
1160 1165 1170	
gga cac gcc gtg ggc cta ttc agg gcc gcg gtg tgc acc cgt gga gtg	3908
Gly His Ala Val Gly Leu Phe Arg Ala Ala Val Cys Thr Arg Gly Val	
1175 1180 1185	
gct aaa gcg gtg gac ttt atc cct gtg gag aac cta ggg aca acc atg	3956
Ala Lys Ala Val Asp Phe Ile Pro Val Glu Asn Leu Gly Thr Thr Met	
1190 1195 1200 1205	
aga tcc ccg gtg ttc acg gac aac tcc tct cca cca gca gtg ccc cag	4004
Arg Ser Pro Val Phe Thr Asp Asn Ser Ser Pro Pro Ala Val Pro Gln	
1210 1215 1220	
agc ttc cag gtg gcc cac ctg cat gct ccc acc ggc agc ggt aag agc	4052
Ser Phe Gln Val Ala His Leu His Ala Pro Thr Gly Ser Gly Lys Ser	
1225 1230 1235	
acc aag gtc ccg gct gcg tac gca gcc cag ggc tac aag gtg ttg gtg	4100
Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly Tyr Lys Val Leu Val	
1240 1245 1250	
ctc aac ccc tct gtt gct gca acg ctg ggc ttt ggt gct tac atg tcc	4148
Leu Asn Pro Ser Val Ala Ala Thr Leu Gly Phe Gly Ala Tyr Met Ser	
1255 1260 1265	
aag gcc cat ggg gtt gat cct aat atc agg acc ggg gtg aga aca att	4196
Lys Ala His Gly Val Asp Pro Asn Ile Arg Thr Gly Val Arg Thr Ile	
1270 1275 1280 1285	
acc act ggc agc ccc atc acg tac tcc acc tac ggc aag ttc ctt gcc	4244

Thr Thr Gly Ser Pro Ile Thr Tyr Ser Thr Tyr Gly Lys Phe Leu Ala	
1290 1295 1300	
gac ggc ggg tgc tca gga ggt gct tat gac ata ata att tgt gac gag	4292
Asp Gly Gly Cys Ser Gly Gly Ala Tyr Asp Ile Ile Ile Cys Asp Glu	
1305 1310 1315	
tgc cac tcc acg gat gcc aca tcc atc ttg ggc atc ggc act gtc ctt	4340
Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly Ile Gly Thr Val Leu	
1320 1325 1330	
gac caa gca gag act gcg ggg gcg aga ctg gtt gtg ctc gcc act gct	4388
Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val Val Leu Ala Thr Ala	
1335 1340 1345	
acc cct ccg ggc tcc gtc act gtg tcc cat cct aac atc gag gag gtt	4436
Thr Pro Pro Gly Ser Val Thr Val Ser His Pro Asn Ile Glu Glu Val	
1350 1355 1360 1365	
gct ctg tcc acc acc gga gag atc ccc ttt tac ggc aag gct atc ccc	4484
Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr Gly Lys Ala Ile Pro	
1370 1375 1380	
ctc gag gtg atc aag ggg gga aga cat ctc atc ttc tgc cac tca aag	4532
Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile Phe Cys His Ser Lys	
1385 1390 1395	
aag aag tgc gac gag ctc gcc gcg aag ctg gtc gca ttg ggc atc aat	4580
Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val Ala Leu Gly Ile Asn	
1400 1405 1410	
gcc gtg gcc tac tac cgc ggt ctt gac gtg tct gtc atc ccg acc agc	4628
Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser Val Ile Pro Thr Ser	
1415 1420 1425	
ggc gat gtt gtc gtc gtg tcg acc gat gct ctc atg act ggc ttt acc	4676
Gly Asp Val Val Val Ser Thr Asp Ala Leu Met Thr Gly Phe Thr	
1430 1435 1440 1445	
ggc gac ttc gac tct gtg ata gac tgc aac acg tgt gtc act cag aca	4724
Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr Cys Val Thr Gln Thr	
1450 1455 1460	
gtc gat ttc agc ctt gac cct acc ttt acc att gag aca acc acg ctc	4772
Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile Glu Thr Thr Thr Leu	
1465 1470 1475	
ccc cag gat gct gtc tcc agg act caa cgc cgg ggc agg act ggc agg	4820
Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg Gly Arg Thr Gly Arg	
1480 1485 1490	
ggg aag cca ggc atc tat aga ttt gtg gca ccg ggg gag cgc ccc tcc	4868
Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro Gly Glu Arg Pro Ser	
1495 1500 1505	
ggc atg ttc gac tcg tcc gtc ctc tgt gag tgc tat gac gcg ggc tgt	4916
Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys Tyr Asp Ala Gly Cys	
1510 1515 1520 1525	
gct tgg tat gag ctc acg ccc gcc gag act aca gtt agg cta cga gcg	4964
Ala Trp Tyr Glu Leu Thr Pro Ala Glu Thr Thr Val Arg Leu Arg Ala	

1530	1535	1540	
tac atg aac acc ccg ggg ctt ccc gtg tgc cag gac cat ctt gaa ttt			5012
Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln Asp His Leu Glu Phe			
1545	1550	1555	
tgg gag ggc gtc ttt acg ggc ctc act cat ata gat gcc cac ttt tta			5060
Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile Asp Ala His Phe Leu			
1560	1565	1570	
tcc cag aca aag cag agt ggg gag aac ttt cct tac ctg gta gcg tac			5108
Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro Tyr Leu Val Ala Tyr			
1575	1580	1585	
caa gcc acc gtg tgc gct agg gct caa gcc cct ccc cca tcg tgg gac			5156
Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro Pro Pro Ser Trp Asp			
1590	1595	1600	1605
cag atg tgg aag tgt ttg atc cgc ctt aaa ccc acc ctc cat ggg cca			5204
Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro Thr Leu His Gly Pro			
1610	1615	1620	
aca ccc ctg cta tac aga ctg ggc gct gtt cag aat gaa gtc acc ctg			5252
Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn Glu Val Thr Leu			
1625	1630	1635	
acg cac cca atc acc aaa tac atc atg aca tgc atg tcg gcc gac ctg			5300
Thr His Pro Ile Thr Lys Tyr Ile Met Thr Cys Met Ser Ala Asp Leu			
1640	1645	1650	
gag gtc gtc acg agc acc tgg gtg ctc gtt ggc ggc gtc ctg gct gct			5348
Glu Val Val Thr Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala Ala			
1655	1660	1665	
ctg gcc gcg tat tgc ctg tca aca ggc tgc gtg gtc ata gtg ggc agg			5396
Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val Ile Val Gly Arg			
1670	1675	1680	1685
atc gtc ttg tcc ggg aag ccg gca att ata cct gac agg gag gtt ctc			5444
Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp Arg Glu Val Leu			
1690	1695	1700	
tac cag gag ttc gat gag atg gaa gag tgc tct cag cac tta ccg tac			5492
Tyr Gln Glu Phe Asp Glu Met Glu Glu Cys Ser Gln His Leu Pro Tyr			
1705	1710	1715	
atc gag caa ggg atg atg ctc gct gag cag ttc aag cag aag gcc ctc			5540
Ile Glu Gln Gly Met Met Leu Ala Glu Gln Phe Lys Gln Lys Ala Leu			
1720	1725	1730	
ggc ctc ctg cag acc gcg tcc cgc cat gca gag gtt atc acc cct gct			5588
Gly Leu Leu Gln Thr Ala Ser Arg His Ala Glu Val Ile Thr Pro Ala			
1735	1740	1745	
gtc cag acc aac tgg cag aaa ctc gag gtc ttt tgg gcg aag cac atg			5636
Val Gln Thr Asn Trp Gln Lys Leu Glu Val Phe Trp Ala Lys His Met			
1750	1755	1760	1765
tgg aat ttc atc agt ggg ata caa tac ttg gcg ggc ctg tca acg ctg			5684
Trp Asn Phe Ile Ser Gly Ile Gln Tyr Leu Ala Gly Leu Ser Thr Leu			
1770	1775	1780	

cct ggt aac ccc gcc att gct tca ttg atg gct ttt aca gct gcc gtc	5732
Pro Gly Asn Pro Ala Ile Ala Ser Leu Met Ala Phe Thr Ala Ala Val	
1785 1790 1795	
acc agc cca cta acc act ggc caa acc ctc ctc ttc aac ata ttg ggg	5780
Thr Ser Pro Leu Thr Thr Gly Gln Thr Leu Leu Phe Asn Ile Leu Gly	
1800 1805 1810	
ggg tgg gtg gct gcc cag ctc gcc gcc ccc ggt gcc gct act gcc ttt	5828
Gly Trp Val Ala Ala Gln Leu Ala Ala Pro Gly Ala Ala Thr Ala Phe	
1815 1820 1825	
gtg ggt gct ggc cta gct ggc gcc gcc atc ggc agc gtt gga ctg ggg	5876
Val Gly Ala Gly Leu Ala Gly Ala Ala Ile Gly Ser Val Gly Leu Gly	
1830 1835 1840 1845	
aag gtc ctc gtg gac att ctt gca ggg tat ggc gcg ggc gtg gcg gga	5924
Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly Ala Gly Val Ala Gly	
1850 1855 1860	
gct ctt gta gca ttc aag atc atg agc ggt gag gtc ccc tcc acg gag	5972
Ala Leu Val Ala Phe Lys Ile Met Ser Gly Glu Val Pro Ser Thr Glu	
1865 1870 1875	
gac ctg gtc aat ctg ctg ccc gcc atc ctc tcg cct gga gcc ctt gta	6020
Asp Leu Val Asn Leu Leu Pro Ala Ile Leu Ser Pro Gly Ala Leu Val	
1880 1885 1890	
gtc ggt gtg gtc tgc gca gca ata ctg cgc cgg cac gtt ggc ccg ggc	6068
Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg His Val Gly Pro Gly	
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Gly Asn His Val Ser Pro Thr His Tyr Val Pro Glu Ser Asp Ala Ala	
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Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr Val Thr Gln Leu Leu	
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Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys Thr Thr Pro Cys Ser	
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Asp Phe Lys Thr Trp Leu Lys Ala Lys Leu Met Pro Gln Leu Pro Gly	
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Ile Pro Phe Val Ser Cys Gln Arg Gly Tyr Arg Gly Val Trp Arg Gly	
2010 2015 2020	

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cat gtc aaa aac ggg acg atg agg atc gtc ggt cct agg acc tgc agg His Val Lys Asn Gly Thr Met Arg Ile Val Gly Pro Arg Thr Cys Arg 2040 2045 2050	6500
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Pro Pro Arg Lys Lys Arg Thr Val Val Leu Thr Glu Ser Thr Leu Ser	
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Cys Val Gln Pro Glu Lys Gly Gly Arg Lys	Pro Ala Arg Leu Ile Val		
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Ser Thr Val Thr Glu Ser Asp Ile Arg Thr	Glu Glu Ala Ile Tyr Gln		
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9599

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Cys	Gly	Asp	Ile	Ile	Asn	Gly	Leu	Pro	Val	Ser	Ala	Arg	Arg	Gly	Gln	
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Glu	Ile	Leu	Leu	Gly	Pro	Ala	Asp	Gly	Met	Val	Ser	Lys	Gly	Trp	Arg	
1010						1015				1020						
Leu	Leu	Ala	Pro	Ile	Thr	Ala	Tyr	Ala	Gln	Gln	Thr	Arg	Gly	Leu	Leu	
1025					1030					1035					1040	
Gly	Cys	Ile	Ile	Thr	Ser	Leu	Thr	Gly	Arg	Asp	Lys	Asn	Gln	Val	Glu	
			1045						1050					1055		
Gly	Glu	Val	Gln	Ile	Val	Ser	Thr	Ala	Thr	Gln	Thr	Phe	Leu	Ala	Thr	
		1060						1065				1070				
Cys	Ile	Asn	Gly	Val	Cys	Trp	Thr	Val	Tyr	His	Gly	Ala	Gly	Thr	Arg	
	1075						1080				1085					
Thr	Ile	Ala	Ser	Pro	Lys	Gly	Pro	Val	Ile	Gln	Met	Tyr	Thr	Asn	Val	
1090					1095						1100					
Asp	Gln	Asp	Leu	Val	Gly	Trp	Pro	Ala	Pro	Gln	Gly	Ser	Arg	Ser	Leu	
1105				1110						1115					1120	
Thr	Pro	Cys	Thr	Cys	Gly	Ser	Ser	Asp	Leu	Tyr	Leu	Val	Thr	Arg	His	
			1125						1130					1135		
Ala	Asp	Val	Ile	Pro	Val	Arg	Arg	Arg	Gly	Asp	Ser	Arg	Gly	Ser	Leu	
		1140					1145					1150				
Leu	Ser	Pro	Arg	Pro	Ile	Ser	Tyr	Leu	Lys	Gly	Ser	Ser	Gly	Gly	Pro	
	1155					1160					1165					
Leu	Leu	Cys	Pro	Ala	Gly	His	Ala	Val	Gly	Leu	Phe	Arg	Ala	Ala	Val	
	1170				1175					1180						
Cys	Thr	Arg	Gly	Val	Ala	Lys	Ala	Val	Asp	Phe	Ile	Pro	Val	Glu	Asn	
1185				1190						1195					1200	
Leu	Gly	Thr	Thr	Met	Arg	Ser	Pro	Val	Phe	Thr	Asp	Asn	Ser	Ser	Pro	
			1205						1210					1215		
Pro	Ala	Val	Pro	Gln	Ser	Phe	Gln	Val	Ala	His	Leu	His	Ala	Pro	Thr	
		1220					1225						1230			
Gly	Ser	Gly	Lys	Ser	Thr	Lys	Val	Pro	Ala	Ala	Tyr	Ala	Ala	Gln	Gly	
	1235					1240					1245					
Tyr	Lys	Val	Leu	Val	Leu	Asn	Pro	Ser	Val	Ala	Ala	Thr	Leu	Gly	Phe	
	1250				1255						1260					
Gly	Ala	Tyr	Met	Ser	Lys	Ala	His	Gly	Val	Asp	Pro	Asn	Ile	Arg	Thr	
1265				1270						1275					1280	
Gly	Val	Arg	Thr	Ile	Thr	Thr	Gly	Ser	Pro	Ile	Thr	Tyr	Ser	Thr	Tyr	
			1285						1290					1295		
Gly	Lys	Phe	Leu	Ala	Asp	Gly	Gly	Cys	Ser	Gly	Gly	Ala	Tyr	Asp	Ile	
		1300					1305						1310			

Ile Ile Cys Asp Glu Cys His Ser Thr Asp Ala Thr Ser Ile Leu Gly
1315 1320 1325
Ile Gly Thr Val Leu Asp Gln Ala Glu Thr Ala Gly Ala Arg Leu Val
1330 1335 1340
Val Leu Ala Thr Ala Thr Pro Pro Gly Ser Val Thr Val Ser His Pro
1345 1350 1355 1360
Asn Ile Glu Glu Val Ala Leu Ser Thr Thr Gly Glu Ile Pro Phe Tyr
1365 1370 1375
Gly Lys Ala Ile Pro Leu Glu Val Ile Lys Gly Gly Arg His Leu Ile
1380 1385 1390
Phe Cys His Ser Lys Lys Lys Cys Asp Glu Leu Ala Ala Lys Leu Val
1395 1400 1405
Ala Leu Gly Ile Asn Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser
1410 1415 1420
Val Ile Pro Thr Ser Gly Asp Val Val Val Val Ser Thr Asp Ala Leu
1425 1430 1435 1440
Met Thr Gly Phe Thr Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr
1445 1450 1455
Cys Val Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile
1460 1465 1470
Glu Thr Thr Thr Leu Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg
1475 1480 1485
Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala Pro
1490 1495 1500
Gly Glu Arg Pro Ser Gly Met Phe Asp Ser Ser Val Leu Cys Glu Cys
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Tyr Asp Ala Gly Cys Ala Trp Tyr Glu Leu Thr Pro Ala Glu Thr Thr
1525 1530 1535
Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu Pro Val Cys Gln
1540 1545 1550
Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr Gly Leu Thr His Ile
1555 1560 1565
Asp Ala His Phe Leu Ser Gln Thr Lys Gln Ser Gly Glu Asn Phe Pro
1570 1575 1580
Tyr Leu Val Ala Tyr Gln Ala Thr Val Cys Ala Arg Ala Gln Ala Pro
1585 1590 1595 1600
Pro Pro Ser Trp Asp Gln Met Trp Lys Cys Leu Ile Arg Leu Lys Pro
1605 1610 1615
Thr Leu His Gly Pro Thr Pro Leu Leu Tyr Arg Leu Gly Ala Val Gln
1620 1625 1630
Asn Glu Val Thr Leu Thr His Pro Ile Thr Lys Tyr Ile Met Thr Cys
1635 1640 1645
Met Ser Ala Asp Leu Glu Val Val Thr Ser Thr Trp Val Leu Val Gly
1650 1655 1660
Gly Val Leu Ala Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val
1665 1670 1675 1680
Val Ile Val Gly Arg Ile Val Leu Ser Gly Lys Pro Ala Ile Ile Pro
1685 1690 1695
Asp Arg Glu Val Leu Tyr Gln Glu Phe Asp Glu Met Glu Glu Cys Ser
1700 1705 1710
Gln His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu Ala Glu Gln Phe
1715 1720 1725
Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser Arg His Ala Glu
1730 1735 1740
Val Ile Thr Pro Ala Val Gln Thr Asn Trp Gln Lys Leu Glu Val Phe
1745 1750 1755 1760
Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile Gln Tyr Leu Ala
1765 1770 1775
Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala Ser Leu Met Ala
1780 1785 1790
Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr Gly Gln Thr Leu Leu

1795	1800	1805
Phe Asn Ile Leu Gly Gly Trp Val Ala Ala Gln Leu Ala Ala Pro Gly		
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Ala Ala Thr Ala Phe Val Gly Ala Gly Leu Ala Gly Ala Ala Ile Gly		
1825	1830	1835
Ser Val Gly Leu Gly Lys Val Leu Val Asp Ile Leu Ala Gly Tyr Gly		1840
1845	1850	1855
Ala Gly Val Ala Gly Ala Leu Val Ala Phe Lys Ile Met Ser Gly Glu		
1860	1865	1870
Val Pro Ser Thr Glu Asp Leu Val Asn Leu Leu Pro Ala Ile Leu Ser		
1875	1880	1885
Pro Gly Ala Leu Val Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg		
1890	1895	1900
His Val Gly Pro Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile		
1905	1910	1915
Ala Phe Ala Ser Arg Gly Asn His Val Ser Pro Thr His Tyr Val Pro		1920
1925	1930	1935
Glu Ser Asp Ala Ala Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr		
1940	1945	1950
Val Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys		
1955	1960	1965
Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile Trp Asp Trp Ile		
1970	1975	1980
Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys Ala Lys Leu Met		
1985	1990	1995
Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln Arg Gly Tyr Arg		2000
2005	2010	2015
Gly Val Trp Arg Gly Asp Gly Ile Met His Thr Arg Cys His Cys Gly		
2020	2025	2030
Ala Glu Ile Thr Gly His Val Lys Asn Gly Thr Met Arg Ile Val Gly		
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Pro Arg Thr Cys Arg Asn Met Trp Ser Gly Thr Phe Pro Ile Asn Ala		
2050	2055	2060
Tyr Thr Thr Gly Pro Cys Thr Pro Leu Pro Ala Pro Asn Tyr Lys Phe		
2065	2070	2075
Ala Leu Trp Arg Val Ser Ala Glu Glu Tyr Val Glu Ile Arg Arg Val		
2085	2090	2095
Gly Asp Phe His Tyr Val Ser Gly Met Thr Thr Asp Asn Leu Lys Cys		
2100	2105	2110
Pro Cys Gln Ile Pro Ser Pro Glu Phe Phe Thr Glu Leu Asp Gly Val		
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Arg Leu His Arg Phe Ala Pro Pro Cys Lys Pro Leu Leu Arg Glu Glu		
2130	2135	2140
Val Ser Phe Arg Val Gly Leu His Glu Tyr Pro Val Gly Ser Gln Leu		
2145	2150	2155
Pro Cys Glu Pro Glu Pro Asp Val Ala Val Leu Thr Ser Met Leu Thr		2160
2165	2170	2175
Asp Pro Ser His Ile Thr Ala Glu Ala Ala Gly Arg Arg Leu Ala Arg		
2180	2185	2190
Gly Ser Pro Pro Ser Met Ala Ser Ser Ser Ala Ser Gln Leu Ser Ala		
2195	2200	2205
Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp Ser Pro Asp Ala		
2210	2215	2220
Glu Leu Ile Glu Ala Asn Leu Leu Trp Arg Gln Glu Met Gly Gly Asn		
2225	2230	2235
Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile Leu Asp Ser Phe		2240
2245	2250	2255
Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Val Ser Val Pro Ala		
2260	2265	2270
Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Arg Ala Leu Pro Val Trp		
2275	2280	2285

Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val Glu Thr Trp Lys Lys Pro
 2290 2295 2300
 Asp Tyr Glu Pro Pro Val Val His Gly Cys Pro Leu Pro Pro Pro Arg
 2305 2310 2315 2320
 Ser Pro Pro Val Pro Pro Pro Arg Lys Lys Arg Thr Val Val Leu Thr
 2325 2330 2335
 Glu Ser Thr Leu Ser Thr Ala Leu Ala Glu Leu Ala Thr Lys Ser Phe
 2340 2345 2350
 Gly Ser Ser Ser Thr Ser Gly Ile Thr Gly Asp Asn Thr Thr Thr Ser
 2355 2360 2365
 Ser Glu Pro Ala Pro Ser Gly Cys Pro Pro Asp Ser Asp Val Glu Ser
 2370 2375 2380
 Tyr Ser Ser Met Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu
 2385 2390 2395 2400
 Ser Asp Gly Ser Trp Ser Thr Val Ser Ser Gly Ala Asp Thr Glu Asp
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 Val Val Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr
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 Pro Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn Ala Leu Ser Asn
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 Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr Thr Ser Arg Ser
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 Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys Ala Ala Ala Ser
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 Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala Cys Ser Leu Thr
 2500 2505 2510
 Pro Pro His Ser Ala Lys Ser Lys Phe Gly Tyr Gly Ala Lys Asp Val
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 Arg Cys His Ala Arg Lys Ala Val Ala His Ile Asn Ser Val Trp Lys
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 Asp Leu Leu Glu Asp Ser Val Thr Pro Ile Asp Thr Thr Ile Met Ala
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 Ala Arg Leu Ile Val Phe Pro Asp Leu Gly Val Arg Val Cys Glu Lys
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 Met Ala Leu Tyr Asp Val Val Ser Lys Leu Pro Leu Ala Val Met Gly
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 Val Gln Ala Trp Lys Ser Lys Lys Thr Pro Met Gly Phe Ser Tyr Asp
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 Thr Arg Cys Phe Asp Ser Thr Val Thr Glu Ser Asp Ile Arg Thr Glu
 2645 2650 2655
 Glu Ala Ile Tyr Gln Cys Cys Asp Leu Asp Pro Gln Ala Arg Val Ala
 2660 2665 2670
 Ile Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly Pro Leu Thr Asn
 2675 2680 2685
 Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg Ala Ser Gly Val
 2690 2695 2700
 Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Cys Tyr Ile Lys Ala Arg
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 Ala Ala Cys Arg Ala Ala Gly Leu Gln Asp Cys Thr Met Leu Val Cys
 2725 2730 2735
 Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly Val Gln Glu Asp
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 Ala Ala Ser Leu Arg Ala Phe Thr Glu Ala Met Thr Arg Tyr Ser Ala
 2755 2760 2765
 Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr Asp Leu Glu Leu Ile Thr

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 Trp Glu Thr Ala Arg His Thr Pro Val Asn Ser Trp Leu Gly Asn Ile
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 Leu Phe Asn Trp Ala Val Arg Thr Lys Leu Lys Leu Thr Pro Ile Ala
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 Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg Pro Arg Trp Phe
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 Pro Asn Arg
 3010

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 <212> DNA
 <213> Artificial Sequence

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 Primer

<400> 15
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21

<210> 16
 <211> 19
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic
 Primer

<400> 16
 ccagttccgg gcaagaact

19